



ecology and environment, inc.

International Specialists in the Environment

Portland Office
333 SW Fifth Avenue, Suite 608
Portland, Oregon 97204
Tel: (503) 248-5600, Fax: (503) 248-5577

Technical Memorandum

To: Kevin Parrett, Project Manager (DEQ) -- McCormick and Baxter Superfund Site

Date: June 18, 2004

From: Erin Lynch, Task Order Manager (E & E)

Subject: Chemical Analyses of Import Topsoil and Sand

Introduction

Ecology and Environment, Inc., (E & E) under contract to the Oregon Department of Environmental Quality (DEQ) (Task Order No. 71-03-12), collected samples and performed chemical analysis of Remtech's (DEQ's contractor for the McCormick and Baxter sediment cap construction) proposed sources of import topsoil and sand to be used for the upland soil cap, sediment cap bank cap and sediment cap sand layer at the McCormick & Baxter Superfund Site in Portland, Oregon.

The proposed source of topsoil is the overburden of a recently permitted gravel quarry owned by Morse Brothers, Inc. The site is approximately four miles north of St. Helens, Oregon and adjacent to Highway 30. The site is known as the Reichhold Quarry. This site has historically been used as a pasture. Earlier use may have included light agricultural production. Based on past use, the site soil is not expected to have significant levels of pollutants.

The proposed source of sand is an existing stockpile of Columbia River Navigational Channel maintenance dredge spoils located at the Port of St. Helens. The material was previously dredged by the Port of St. Helens from the Upper Martin Island Bar. E & E's understanding is that the dredge site is located on Port of St. Helens property between river miles 80 and 85 and centered on river mile 82.8 in the vicinity of St. Helens, Oregon. E & E is awaiting confirmation of this location from Remtech. The site is formally known as Disposal Site Upper Martin Island Bar, O-82.8. The sand will be supplied by Morse Brothers, Inc. A copy of the dredge and disposal permits for this material is provided in Remtech's Draft Construction Operations Plan (April 2004). The U.S. Army Corp of Engineers has extensive chemical and physical data on the Columbia River Navigational Channel with respect to maintenance dredge material. This

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material is primarily medium to coarse sand with very low organic carbon and very few fines. These data as well as the mechanism for filling the navigational channel (i.e., primarily sand wave formation) support the conclusion that the navigational channel maintenance dredge spoils are not expected to have significant levels of pollutants.

The purpose of sampling and chemical analysis of the proposed topsoil and sand was to verify that these materials do not contain pollutants that would render the material unsuitable for use at the McCormick & Baxter site.

Sampling Procedures

The Port of St. Helens dredge sand consisted of a single stockpile estimated to contain 112,000 cubic yards of material. The stockpile was divided into quadrants for sampling purposes. Quadrants were labeled A, B, C, and D where A represents the southeast quadrant and subsequent samples were collected in alphabetical order in a counterclockwise direction. A boring was hand augured in each quadrant to a depth of approximately 3 feet, below ground surface (bgs). Samples were collected in one-foot depth intervals. The samples collected from an individual hole were then composited and placed in appropriate sample jars. The sample jars were placed on ice in a cooler. Samples for VOC analysis were not composited, rather discrete grab samples were collected from 1 foot, bgs. Samples were labeled SH-A-042204, SH-B-042204, SH-C-042204, and SH-D-042204 where SH indicates the St. Helens stockpile, A indicates the quadrant, and 042204 indicates the sampling date.

The Morse Brothers, Inc. quarry topsoil was sampled by hand augering holes in the center of four equal areas starting from the northwest corner of the property and working toward the southeast in an arc. Each area was labeled 1 through 4, where 1 represents the northwest area and subsequent samples were collected in numerical order toward the southeast. A boring was hand augered in each area to a depth of approximately 3 feet, bgs. Samples were collected in one-foot depth intervals. The samples collected from an individual hole were then composited and placed in appropriate sample jars. The sample jars were placed on ice in a cooler. Samples for VOC analysis were not composited, rather discrete grab samples were collected from 1 foot, bgs. Samples were labeled MB-1-042204, MB-2-042204, MB-3-042204, and MB-4-042204 where MB indicates Morse Brothers topsoil, 1 indicates the sampling area, and 042204 indicates the sampling date.

All samples were analyzed for metals (arsenic, barium, cadmium, chromium, copper, lead, selenium, silver, zinc, and mercury), volatile organic compounds (VOCs) by EPA Method 8260B, semivolatile organic compounds (SVOCs) by EPA Method 8270C, pesticides by EPA Method 8081 and 8141, herbicides by EPA Method 8151, Northwest Total Petroleum Hydrocarbons – gasoline (NWTPH-Gx), and Northwest Total Petroleum Hydrocarbons – diesel (NWTPH-Dx) at STL Laboratories in Tacoma, Washington. In addition, a single sample from each site was analyzed for dioxin/furan (SH-A-042204 and MB-2-042204).

Comparison to Reference Levels

Analytical results were compared to a suite of reference levels indicative of “Clean Fill” as defined by OAR 340-093-0030(13):

- Cleanup goals for sediment from the McCormick and Baxter, Record of Decision (EPA 1996);
- EPA Region 9 Preliminary Remedial Goals (PRGs) for both residential and industrial soils (EPA 2002);

- DEQ Guidance for Ecological Risk Assessment Level II Screening Level Values for Freshwater Sediment (Ecological Risk Assessment Level II Screening Value) (DEQ 2001);
- DEQ Suggested Default Background Concentrations for Inorganic Contaminants for Freshwater Sediment (DEQ 2002); and
- Ecological threshold concentrations for bulk sediment derived for the E & E technical memorandum to DEQ dated January 16, 2004, Response to Hart Crowser, Inc. Comment on Sediment Cap Basis of Design (E & E 2003)

These “protective levels” are provided in Table 1.

As shown in Tables 2 and 3, several organic contaminants were detected in either the topsoil or sand: Lindane (0.4 ug/kg), toluene (1.4 ug/kg), xylene (2.2 ug/kg), benzoic acid (421 ug/kg), fluoranthene (18.7 ug/kg) and dioxin/furan (0.68 pg TEQ/g). Additionally, a number of PAHs were detected in sand sample SH-A-042204: LPAHs (0 ug/kg), HPAHs (87 ug/kg), CPAHs (44.3 ug/kg), and Total PAHs (133.3 ug/kg). No organic contaminants were detected in either the topsoil or sand that exceeded any of the reference levels.

As shown in Table 2, one sample slightly exceeded the DEQ Ecological Risk Assessment Level II Screening Level for arsenic, and several samples contained lead and zinc that slightly exceeded the DEQ Suggested Default Background Concentrations for Metals for Freshwater Sediment.

Arsenic slightly exceeded the Ecological Risk Assessment Level II Screening Value of 6 mg/kg in MB-1-042204 (6.11 mg/kg) from the topsoil. In addition, the arsenic detection of 6.11 mg/kg did not exceed any of the other “protective levels” including the DEQ suggested default background concentration for arsenic of 7.9 mg/kg. This detection of 6.11 mg/kg is believed to be representative of background concentrations for arsenic.

All samples exceeded the DEQ suggested default background concentration for lead of 2 mg/kg. Concentrations of lead range from 2.4 mg/kg to 5.4 mg/kg in the sand (Table 2). Concentrations of lead range from 5.8 mg/kg to 7.7 mg/kg in the topsoil (Table 2). Although lead concentrations exceeded the DEQ Default Background Concentration, detections are two and three orders of magnitude less than the EPA PRGs for lead and the Ecological Risk Assessment Level II Screening Value for lead. In addition, lead concentrations were detected in all samples regardless of location within the sand pile or within the topsoil, indicating a point source for lead is not likely and detections likely represent background concentrations.

One of the sand samples (SH-A-042204, 57.4 mg/kg, Table 2) slightly exceeded the zinc concentration (53 mg/kg) set in the DEQ suggested default background concentrations. All samples from the topsoil slightly exceeded the same zinc level. Concentrations of zinc in these samples range from 62.3 mg/kg to 69.8 mg/kg. All zinc detections are several orders of magnitude below EPA PRGs for zinc and are well below the Ecological Risk Assessment Level II Screening Value for zinc. The detections of zinc are believed to represent background concentrations.

Summary and Recommendation

Four samples from a dredge sand stockpile at the Port of St. Helens and four topsoil samples from the Morse Brothers quarry near St. Helens, Oregon were collected and analyzed for metals, VOCs, SVOCs, pesticides, herbicides, and total petroleum hydrocarbons. One sample from each material was analyzed for dioxin/furan. Results of laboratory analyses indicate that VOCs, SVOCs, pesticides, herbicides, total petroleum hydrocarbons and dioxin are not present at levels

of concern in the proposed sand and topsoil, although laboratory analysis revealed trace levels of Lindane, toluene, xylene, fluoranthene, benzoic acid, PAHs, and dioxin/furan. Laboratory analyses indicated that of the 10 metals evaluated only lead and zinc slightly exceeded the DEQ Suggested Default Background Concentrations for Metals in Freshwater Sediment and that arsenic slightly exceeded the DEQ Ecological Screening Level Values.

An E & E chemist provided a quality assurance/quality control data summary check. Data validation memoranda are attached as an Appendix.

Based on the history of the topsoil and sand and a comparison of analytical results to a suite of reference levels, E & E believes that both the St. Helens dredge sand and the Morse Brothers topsoil meet the OAR definition of clean fill, and we recommend that these materials be approved for use at the McCormick and Baxter site.

If you have any questions regarding the information presented in this Technical Memorandum, please contact either John Montgomery or Erin Lynch at (503) 248-5600.

References:

Ecology and Environment, Inc. (E & E), January 2003, Response to Hart Crowser, Inc. Comment on Sediment Cap Basis of Design, McCormick and Baxter Creosoting Company Site, Portland, Oregon, Technical Memorandum to DEQ.

Oregon Department of Environmental Quality (DEQ), October 2002, Default background concentrations for metals: Toxicology Workgroup, Technical Memorandum.

_____, 2001, Guidance for Ecological Risk Assessment, Waste Management & Cleanup Division, Cleanup Policy & Program Development Section, Portland, Oregon.

Remtech, April 2004, Draft Construction Operations Plan, McCormick and Baxter Creosoting Company Portland, Oregon, Sediment Cap.

United States Environmental Protection Agency, October 1, 2002c, Region 9 Preliminary Remediation Goals, prepared by Stanford J. Smucker, Ph.D., San Francisco, California.

_____, March 1996, Record of Decision (ROD), McCormick and Baxter Creosoting Company, Portland Plant, Portland, Oregon.

Attachments:

Table 1: Summary of Protective Values

Table 2: Inorganic and Organic Analytical Results

Table 3: Dioxin/Furan Analytical Results

Appendix: Data Validation Memoranda

Table 1. Summary of Cleanup Goals and Limitations
McCormick and Baxter Creosoting Company
Portland, Oregon

Compound	EPA Record of Decision (1996) Cleanup Goals for Sediment (mg/kg, dry weight)	EPA Region 9 Preliminary Remediation Goals (PRGs)				Oregon DEQ (2001) Guidance for Ecological Risk Assessment Level II Screening Level Values		Oregon DEQ (2002) Suggested Default Background Concentrations for Metals for Freshwater Sediment		Ecology and Environment, Inc. (January 16, 2003) Technical Memorandum to Oregon DEQ Response to Hart Crowser Inc., Comment on Sediment Cap Basis of Design		
		Residential Soil (ug/kg)	Residential Soil (mg/kg)	Industrial Soil (ug/kg)	Industrial Soil (mg/kg)	(ug/kg)	(mg/kg)	(ug/kg)	(mg/kg)	Ecological ('92 & '99/01 Data) (ug/kg - dry weight)	Ecological ('99/01 Data) (ug/kg - dry weight)	Human Health (ug/kg)
Inorganics												
Arsenic	12	22,000	22	260,000.00	260	6000	6	7,900	7.9	--	--	12,000
Cadmium	--	37,000	37	450,000.00	450	600	0.6	<500	<0.5	--	--	--
Chromium	--	100,000,000	100,000	100,000,000.00	100,000	52000	52	30,000	30	--	--	--
Copper	--	3,100,000	3,100	41,000,000.00	41,000	19000	19	12,000	12	--	--	--
Lead	--	400,000	400	750,000.00	750	30000	30	2,000	2	--	--	--
Mercury	--	23,000	23	310,000.00	310	100	0.1	200	0.2	--	--	--
Nickel	--	1,600,000	1,600	20,000,000.00	20,000	18000	18	20,000	20	--	--	--
Silver	--	390,000	390	5,100,000.00	5,100	4500	4.5	400	0.4	--	--	--
Selenium	--	390,000	390	5,100,000.00	5,100	--	--	400	0.4	--	--	--
Zinc	--	23,000,000	23,000	100,000,000.00	100,000	123000	123	53,000	53	--	--	--
Organics												
Acetone	--	1,600,000	1,600	6,000,000	6,000	--	--	--	--	--	--	--
Acenaphthene	--	3,700,000	3,700	29,000,000	29,000	290,000	290	--	--	23,333	500	--
Acenaphthylene	--	--	--	--	--	160,000	160	--	--	23,333	500	--
Aldrin	--	29	0.029	100	0.1	40,000	40	--	--	--	--	--
Anthracene	--	22,000,000	22,000	100,000,000	100,000	57,000	57	--	--	23,333	500	--
Benzene	--	600	0.6	1,300	1.3	--	--	--	--	--	--	--
Benzo[a]anthracene	--	620	0.62	2,100	2.1	32,000	32	--	--	9,000	275	286
Benzo[b&k]fluoranthene	--	--	--	--	--	--	--	--	--	--	--	--
Benzo[b]fluoranthene	--	--	--	--	--	--	--	--	--	9,000	275	286
Benzo[k]fluoranthene	--	--	--	--	--	27,000	27	--	--	9,000	275	286
Benzo[a]pyrene	--	62	0.062	210	0.21	32,000	32	--	--	3,000	115	286
Benzo[g,h,i]perylene	--	N/A	N/A	N/A	N/A	300,000	300	--	--	9,000	275	--
Benzoic acid	--	100,000,000	100,000	100,000,000	100,000	--	--	--	--	--	--	--
Benzyl alcohol	--	18,000,000	18,000	100,000,000	100,000	--	--	--	--	--	--	--
BHC (beta)	--	320	0.32	1,300	1.3	--	--	--	--	--	--	--
BHC (gamma) Lindane	--	440	0.44	1,700	1.7	900	0.9	--	--	--	--	--
BHC (technical)	--	320	0.32	1,300	1.3	100,000	100	--	--	--	--	--
Bis(2-ethylhexyl)phthalate (DEHP)	--	35,000	35	120,000	120	750,000	750	--	--	--	--	--
Butyl benzyl phthalate	--	12,000,000	12,000	100,000,000	100,000	--	--	--	--	--	--	--
Carbazole	--	24,000	24	86,000	86	140,000	140	--	--	--	--	--
Carbon tetrachloride	--	250	0.25	550	0.55	--	--	--	--	--	--	--
Chlordane	--	1,600	1.6	6,500	6.5	4,500	4.5	--	--	--	--	--
Chlordane (alpha)	--	--	--	--	--	--	--	--	--	--	--	--
Chloroform	--	3,600	3.6	12,000	12	--	--	--	--	--	--	--
Chrysene	--	62,000	62	21,000	21	57,000	57	--	--	9,000	275	286
DDD	--	2,400	2.4	10,000	10	4,000	4	--	--	--	--	--
DDE	--	1,700	1.7	7,000	7	1,500	1.5	--	--	--	--	--
DDT	--	1,700	1.7	7,000	7	4,000	4	--	--	--	--	--
DDT (Total)	--	--	--	--	--	7,000	7	--	--	--	--	--
Dibenz[a,h]anthracene	--	62	0.062	210	0.21	33,000	33	--	--	9,000	275	286
Dibenzofuran	--	290,000	290	3,100,000	3,100	5,100,000	5100	--	--	--	--	--
Di-n-butyl phthalate	--	--	--	--	--	110,000	110	--	--	--	--	--
1,2-Dichlorobenzene	--	370,000	370	370,000	370	--	--	--	--	--	--	--
1,3-Dichlorobenzene	--	16,000	16	63,000	63	--	--	--	--	--	--	--
1,4-Dichlorobenzene	--	3,400	3.4	7,900	7.9	--	--	--	--	--	--	--

Table 1. Summary of Cleanup Goals and Limitations
McCormick and Baxter Creosoting Company
Portland, Oregon

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McCormick and Baxter Creosoting Company
Portland, Oregon

Compound	EPA Record of Decision (1996) Cleanup Goals for Sediment (mg/kg, dry weight)	EPA Region 9 Preliminary Remediation Goals (PRGs)				Oregon DEQ (2001) Guidance for Ecological Risk Assessment Level II Screening Level Values		Oregon DEQ (2002) Suggested Default Background Concentrations for Metals for Freshwater Sediment		Ecology and Environment, Inc. (January 16, 2003) Technical Memorandum to Oregon DEQ Response to Hart Crowser Inc., Comment on Sediment Cap Basis of Design		
		Residential Soil (ug/kg)	Residential Soil (mg/kg)	Industrial Soil (ug/kg)	Industrial Soil (mg/kg)	(ug/kg)	(mg/kg)	(ug/kg)	(mg/kg)	Ecological ('92 & '99/'01 Data) (ug/kg - dry weight)	Ecological ('99/'01 Data) (ug/kg - dry weight)	Human Health (ug/kg)
Organics												
Total PAH	--	--	--	--	--	1,610,000	1610	--	--	--	--	--
Total CPAH	2	--	--	--	--	--	--	--	--	--	--	2,000
Total LPAH	--	--	--	--	--	76,000	76	--	--	140,000	3,000	--
Total HPAH	--	--	--	--	--	193,000	193	--	--	90,000	2,750	--
Pyrene	--	2,300,000	2,300	29,000,000	29,000	53,000	53	--	--	9,000	275	--
2,3,7,8-TCDD (dioxin)	0.008	0.039	0.000039	0.16	0.00016	9	0.009	--	--	--	--	0.03
Tetrachloroethylene (PCE)	--	1,500	1.5	3,400	3.4	--	--	--	--	--	--	--
Toluene	--	520,000	520	520,000	520	--	--	--	--	--	--	--
Toxaphene	--	440	0.44	1,600	1.6	--	--	--	--	--	--	--
Tributyltin	--	--	--	--	--	--	--	--	--	--	--	--
1,2,4-Trichlorobenzene	--	650,000	650	3,000,000	3,000	--	--	--	--	--	--	--
1,1,1-Trichloroethane	--	1,200,000	1,200	1,200,000	1,200	--	--	--	--	--	--	--
Trichloroethylene (TCE)	--	53	0.053	110	0.11	--	--	--	--	--	--	--
2,4,5-Trichlorophenol	--	6,100,000	6,100	62,000,000	62,000	--	--	--	--	--	--	--
2,4,6-Trichlorophenol	--	6,100	6.1	62,000	62	--	--	--	--	--	--	--
Vinyl Chloride	--	79	0.079	750	0.75	--	--	--	--	--	--	--
Xylene (mixed)	--	270,000	270	420,000	420	--	--	--	--	--	--	--

Table 2. Summary of Inorganic and Organic Analytical Results
McCormick and Baxter Creosoting Company
Portland, Oregon

CONTAMINANT OF CONCERN	Port of St. Helens				Morse Bros.			
	Quad A	Quad B	Quad C	Quad D	Area 1	Area 2	Area 3	Area 4
Sample Designation	SH-A-042204	SH-B-042204	SH-C-042204	SH-D-042204	MB-01-042204	MB-02-042204	MB-03-042204	MB-04-042204
Date Sampled	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004
Inorganic (mg/kg)								
Arsenic	1.48	1.12	1.75	1.63	6.11 ^a	4.35	3.48	3.82
Barium	99.9	40.2	72.8	54	191	184	177	183
Cadmium	0.0716J	<0.52	<0.51	<0.525	<0.611	<0.609	<0.589	<0.626
Chromium	8.4B2	6.99B2	7.08B2	9.43B2	14.6B2	16.3B2	14.1B2	15.4B2
Copper	7.29	6.58	6.66	7.19	10.9	10.5	11.3	11.7
Lead	5.4 ^b	2.52 ^b	2.75 ^b	2.4 ^b	7.34 ^b	7.77 ^b	5.8 ^b	7 ^b
Selenium	<5.72	<5.2	<5.1	<5.25	<6.11	<6.09	<5.89	<6.26
Silver	<1.14	<1.04	<1.02	<1.05	<1.22	<1.22	<1.18	<1.25
Zinc	57.4 ^b	35	43.8	40.9	64.7 ^b	69.8 ^b	64.5 ^b	62.3 ^b
Mercury	0.0105J	<0.0204	0.00695J	0.00862J	0.0319	0.0328	0.0417	0.0232J
Organic (ug/kg)								
Dalapon	<16.2	<15.7	<16.5	<15.1	<18.9	<18.9	<19.6	<19.4
4-Nitrophenol	<32.4	<31.4	<33	<30.2	<37.9	<37.8	<39.3	<38.9
Dicamba	<16.2	<15.7	<16.5	<15.1	<18.9	<18.9	<19.6	<19.4
MCPP	<16.2	<15.7	<16.5	<15.1	<18.9	<18.9	<19.6	<19.4
MCPPA	<16.2	<15.7	<16.5	<15.1	<18.9	<18.9	<19.6	<19.4
Dichloroprop	<16.2	<15.7	<16.5	<15.1	<18.9	<18.9	<19.6	<19.4
2,4-D	<16.2	<15.7	<16.5	<15.1	<18.9	<18.9	<19.6	<19.4
Pentachlorophenol	<16.2	<15.7	<16.5	<15.1	<18.9	<18.9	<19.6	<19.4
Silvex	<16.2	<15.7	<16.5	<15.1	<18.9	<18.9	<19.6	<19.4
2,4,5-T	<16.2	<15.7	<16.5	<15.1	<18.9	<18.9	<19.6	<19.4
2,4,DB	<16.2	<15.7	<16.5	<15.1	<18.9	<18.9	<19.6	<19.4
Dinoseb	<16.2	<15.7	<16.5	<15.1	<18.9	<18.9	<19.6	<19.4
Dichlorvos	<13.7	<12.9	<13.1	<12.3	<14.9	<15.1	<14.8	<15.8
Mevinphos	<10.3	<9.69	<9.85	<9.26	<11.2	<11.3	<11.1	<11.9
Demeton-O-S	<13.7	<12.9	<13.1	<12.3	<14.9	<15.1	<14.8	<15.8
Ethoprop	<13.7	<12.9	<13.1	<12.3	<14.9	<15.1	<14.8	<15.8
Naled	<20.6	<19.4	<19.7	<18.5	<22.4	<22.6	<22.2	<23.7
Sulfotep	<13.7	<12.9	<13.1	<12.3	<14.9	<15.1	<14.8	<15.8
Monocrotaphos	<20.6	<19.4	<19.7	<18.5	<22.4	<22.6	<22.2	<23.7

J= The analyte was analyzed for and positively identified, but the associated numerical value is an estimated quantity.

B2= The analyte was detected in the associated method blank. The analyte concentration in the sample was determined to be significantly higher than the method blank (>10 times the concentration).

<= Practical quantitation limit.

C2= Second column confirmation was performed. The relative percent difference between the evaluated and determined to be < or = to 30%.

14.2 = an exceedance

a= The sample exceeds the Oregon DEQ (2001) Guidance for Ecological Risk Assessment Level II Screening Level Values (mg/kg) for the associated contaminant.

b= The sample exceeds the Oregon DEQ (2002) Suggested Default Background Concentrations for Metals for Freshwater Sediment (mg/kg, dry weight) for the associated contaminant.

c= The sample exceeds the EPA Region 9 Preliminary Remediation Goals (PRGs) for Residential Soil (mg/kg) for the associated contaminant.

d= The sample exceeds the EPA Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (mg/kg) for the associated contaminant.

L= Light Polynuclear Aromatic Hydrocarbons, H= Heavy Polynuclear Aromatic Hydrocarbons, C= Carcinogenic Polynuclear Aromatic Hydrocarbons

Table 2. Summary of Inorganic and Organic Analytical Results
McCormick and Baxter Creosoting Company
Portland, Oregon

CONTAMINANT OF CONCERN	Port of St. Helens				Morse Bros.			
	Area A	Area B	Area C	Area D	Area 1	Area 2	Area 3	Area 4
Sample Designation	SH-A-042204	SH-B-042204	SH-C-042204	SH-D-042204	MB-01-042204	MB-02-042204	MB-03-042204	MB-04-042204
Date Sampled	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004
Organic (ug/kg)								
Phorate	<13.7	<12.9	<13.1	<12.3	<14.9	<15.1	<14.8	<15.8
Dimethoate	<20.6	<19.4	<19.7	<18.5	<22.4	<22.6	<22.2	<23.7
Diazinon	<20.6	<19.4	<19.7	<18.5	<22.4	<22.6	<22.2	<23.7
Disulfoton	<13.7	<12.9	<13.1	<12.3	<14.9	<15.1	<14.8	<15.8
Parathion,methyl	<13.7	<12.9	<13.1	<12.3	<14.9	<15.1	<14.8	<15.8
Ronnel	<13.7	<12.9	<13.1	<12.3	<14.9	<15.1	<14.8	<15.8
Malathion	<27.4	<25.8	<26.3	<24.7	<29.9	<30.1	<29.6	<31.6
Chlorpyrifos	<54.9	<51.7	<52.5	<49.4	<59.8	<60.3	<59.2	<63.2
Fenthion	<20.6	<19.4	<19.7	<18.5	<22.4	<22.6	<22.2	<23.7
Parathion	<13.7	<12.9	<13.1	<12.3	<14.9	<15.1	<14.8	<15.8
Trichloronate	<20.6	<19.4	<19.7	<18.5	<22.4	<22.6	<22.2	<23.7
Tetrachlorvinphos	<6.86	<6.46	<6.56	<6.17	<7.47	<7.53	<7.4	<7.9
Fensulfothion	<41.2	<38.8	<39.4	<37	<44.8	<45.2	<44.4	<47.4
Tokuthion	<20.6	<19.4	<19.7	<18.5	<22.4	<22.6	<22.2	<23.7
Mephos	<20.6	<19.4	<19.7	<18.5	<22.4	<22.6	<22.2	<23.7
Bolstar	<20.6	<19.4	<19.7	<18.5	<22.4	<22.6	<22.2	<23.7
EPN	<13.7	<12.9	<13.1	<12.3	<14.9	<15.1	<14.8	<15.8
Azinphos,methyl	<20.6	<19.4	<19.7	<18.5	<22.4	<22.6	<22.2	<23.7
Coumaphos	<54.9	<51.7	<52.5	<49.4	<59.8	<60.3	<59.2	<63.2
Aldrin	<1.04	<0.944	<1.02	<1.06	<1.15	<1.13	<1.22	<1.19
alpha-BHC	<1.04	<0.944	<1.02	<1.06	<1.15	<1.13	<1.22	<1.19
beta-BHC	<1.04	<0.944	<1.02	<1.06	<1.15	<1.13	<1.22	<1.19
delta-BHC	<1.04	<0.944	<1.02	<1.06	<1.15	<1.13	<1.22	<1.19
gamma-BHC (Lindane)	<1.04	<0.944	<1.02	<1.06	0.407J C2	<1.13	<1.22	<1.19
4,4'-DDD	<2.08	<1.89	<2.03	<2.11	<2.31	<2.26	<2.44	<2.39
4,4'-DDE	<2.08	<1.89	<2.03	<2.11	<2.31	<2.26	<2.44	<2.39
4,4'-DDT	<2.08	<1.89	<2.03	<2.11	<2.31	<2.26	<2.44	<2.39
Dieldrin	<2.08	<1.89	<2.03	<2.11	<2.31	<2.26	<2.44	<2.39
Endosulfan I	<1.04	<0.944	<1.02	<1.06	<1.15	<1.13	<1.22	<1.19
Endosulfan II	<2.08	<1.89	<2.03	<2.11	<2.31	<2.26	<2.44	<2.39

J= The analyte was analyzed for and positively identified, but the associated numerical value is an estimated quantity

B2= The analyte was detected in the associated method blank. The analyte concentration in the sample was determined to be significantly higher than the method blank (>10 times the concentration).

<= Practical quantitation limit.

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14.2 = an exceedance.

a= The sample exceeds the Oregon DEQ (2001) Guidance for Ecological Risk Assessment Level II Screening Level Values (mg/kg) for the associated contaminant.

b= The sample exceeds the Oregon DEQ (2002) Suggested Default Background Concentrations for Metals for Freshwater Sediment (mg/kg, dry weight) for the associated contaminant.

c= The sample exceeds the EPA Region 9 Preliminary Remediation Goals (PRGs) for Residential Soil (mg/kg) for the associated contaminant.

d= The sample exceeds the EPA Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (mg/kg) for the associated contaminant.

L= Light Polynuclear Aromatic Hydrocarbons, H= Heavy Polynuclear Aromatic Hydrocarbons, C= Carcinogenic Polynuclear Aromatic Hydrocarbons

Table 2. Summary of Inorganic and Organic Analytical Results
McCormick and Baxter Creosoting Company
Portland, Oregon

CONTAMINANT OF CONCERN	Port of St. Helens				Morse Bros.			
	Area A	Area B	Area C	Area D	Area 1	Area 2	Area 3	Area 4
Sample Designation	SH-A-042204	SH-B-042204	SH-C-042204	SH-D-042204	MB-01-042204	MB-02-042204	MB-03-042204	MB-04-042204
Date Sampled	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004
Organic (ug/kg)								
Endosulfan sulfate	<2.08	<1.89	<2.03	<2.11	<2.31	<2.26	<2.44	<2.39
Endrin	<2.08	<1.89	<2.03	<2.11	<2.31	<2.26	<2.44	<2.39
Endrin aldehyde	<2.08	<1.89	<2.03	<2.11	<2.31	<2.26	<2.44	<2.39
Heptachlor	<1.04	<0.944	<1.02	<1.06	<1.15	<1.13	<1.22	<1.19
Heptachlor epoxide	<1.04	<0.944	<1.02	<1.06	<1.15	<1.13	<1.22	<1.19
Methoxychlor	<10.4	<9.44	<10.2	<10.6	<11.5	<11.3	<12.2	<11.9
Endrin ketone	<2.08	<1.89	<2.03	<2.11	<2.31	<2.26	<2.44	<2.39
Toxaphene	<104	<94.4	<102	<106	<115	<113	<122	<119
alpha-Chlordane	<1.04	<0.944	<1.02	<1.06	<1.15	<1.13	<1.22	<1.19
gamma-Chlordane	<1.04	<0.944	<1.02	<1.06	<1.15	<1.13	<1.22	<1.19
Dichlorodifluoromethane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Chloromethane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Vinyl chloride	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Bromomethane	<6.78	<6.38	<6.22	<6.1	<8.4	<9.99	<9.34	<9.18
Chloroethane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Trichlorofluoromethane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
1,1-Dichloroethene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Methylene chloride	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
trans-1,2-Dichloroethene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
1,1-Dichloroethane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
2,2-Dichloropropane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
cis-1,2-Dichloroethene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Bromochloromethane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Chloroform	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
1,1,1-Trichloroethane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Carbon Tetrachloride	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
1,1-Dichloropropene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Benzene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
1,2-Dichloroethane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Trichloroethene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84

J= The analyte was analyzed for and positively identified, but the associated numerical value is an estimated quantity.

B3= The analyte was detected in the associated method blank. The analyte concentration in the sample was determined to be significantly higher than the method blank (>10 times the concentration).

<= Practical quantitation limit.

C2= Second column confirmation was performed. The relative percent difference between the evaluated and determined to be < or = to 30%.

14.2 = an exceedance.

a= The sample exceeds the Oregon DEQ (2001) Guidance for Ecological Risk Assessment Level II Screening Level Values (mg/kg) for the associated contaminant.

b= The sample exceeds the Oregon DEQ (2002) Suggested Default Background Concentrations for Metals for Freshwater Sediment (mg/kg, dry weight) for the associated contaminant.

c= The sample exceeds the EPA Region 9 Preliminary Remediation Goals (PRGs) for Residential Soil (mg/kg) for the associated contaminant.

d= The sample exceeds the EPA Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (mg/kg) for the associated contaminant.

L= Light Polynuclear Aromatic Hydrocarbons, H= Heavy Polynuclear Aromatic Hydrocarbons, C= Carcinogenic Polynuclear Aromatic Hydrocarbons

Table 2. Summary of Inorganic and Organic Analytical Results
McCormick and Baxter Creosoting Company
Portland, Oregon

CONTAMINANT OF CONCERN	Port of St. Helens				Morse Bros			
	Area A	Area B	Area C	Area D	Area 1	Area 2	Area 3	Area 4
Sample Designation	SH-A-042204	SH-B-042204	SH-C-042204	SH-D-042204	MB-01-042204	MB-02-042204	MB-03-042204	MB-04-042204
Date Sampled	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004
Organic (ug/kg)								
1,2-Dichloropropane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Dibromomethane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Bromodichloromethane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
cis-1,3-Dichloropropene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Toluene	<1.36	<1.28	<1.24	<1.22	<1.68	1.4J	1.05J	<1.84
trans-1,3-Dichloropropene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
1,1,2-Trichloroethane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Tetrachloroethene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
1,3-Dichloropropane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Dibromochloromethane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
1,2-Dibromoethane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Chlorobenzene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Ethylbenzene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
1,1,1,2-Tetrachloroethane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
m,p-Xylene	<2.71	<2.55	<2.49	<2.44	<3.36	2.17J	<3.74	<3.67
o-Xylene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Styrene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Bromoform	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Isopropylbenzene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Bromobenzene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
n-Propylbenzene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
1,1,2,2-Tetrachloroethane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
1,2,3-Trichloropropane	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
2-Chlorotoluene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
1,3,5-Trimethylbenzene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
4-Chlorotoluene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
t-Butylbenzene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
1,2,4-Trimethylbenzene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
sec-Butylbenzene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
1,3-Dichlorobenzene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
4-Isopropyltoluene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84

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<= Practical quantitation limit.

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14.2 = an exceedance

a= The sample exceeds the Oregon DEQ (2001) Guidance for Ecological Risk Assessment Level II Screening Level Values (mg/kg) for the associated contaminant.

b= The sample exceeds the Oregon DEQ (2002) Suggested Default Background Concentrations for Metals for Freshwater Sediment (mg/kg, dry weight) for the associated contaminant.

c= The sample exceeds the EPA Region 9 Preliminary Remediation Goals (PRGs) for Residential Soil (mg/kg) for the associated contaminant.

d= The sample exceeds the EPA Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (mg/kg) for the associated contaminant.

L= Light Polynuclear Aromatic Hydrocarbons, H= Heavy Polynuclear Aromatic Hydrocarbons, C= Carcinogenic Polynuclear Aromatic Hydrocarbons

Table 2. Summary of Inorganic and Organic Analytical Results
McCormick and Baxter Creosoting Company
Portland, Oregon

CONTAMINANT OF CONCERN	Port of St. Helens				Morse Bros			
	Area A	Area B	Area C	Area D	Area 1	Area 2	Area 3	Area 4
Sample Designation	SH-A-042204	SH-B-042204	SH-C-042204	SH-D-042204	MB-01-042204	MB-02-042204	MB-03-042204	MB-04-042204
Date Sampled	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004
Organic (ug/kg)								
1,4-Dichlorobenzene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
n-Butylbenzene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
1,2-Dichlorobenzene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
1,2-Dibromo-3-chloropropane	<2.71	<2.55	<2.49	<2.44	<3.36	<4	<3.74	<3.67
1,2,4-Trichlorobenzene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Hexachlorobutadiene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Naphthalene ^L	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
1,2,3-Trichlorobenzene	<1.36	<1.28	<1.24	<1.22	<1.68	<2	<1.87	<1.84
Phenol	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
bis(2-Chloroethyl)ether	<113	<95	<102	<100	<121	<122	<121	<123
2-Chlorophenol	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
1,3-Dichlorobenzene	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
1,4-Dichlorobenzene	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
Benzyl Alcohol	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
1,2-Dichlorobenzene	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
2-Methylphenol	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
bis(2-Chloroisopropyl)ether	<282	<238	<256	<250	<304	<304	<302	<306
3-&4-Methylphenol	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
N-nitroso-di-n-propylamine	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
Hexachloroethane	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
Nitrobenzene	<113	<95	<102	<100	<121	<122	<121	<123
Isophorone	<113	<95	<102	<100	<121	<122	<121	<123
2-Nitrophenol	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
2,4-Dimethylphenol	<22.6	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
Benzoic Acid	<677	<570	<614	<600	<728	421J	<725	<735
bis(2-Chloroethoxy)methane	<113	<95	<102	<100	<121	<122	<121	<123
2,4-Dichlorophenol	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
1,2,4-Trichlorobenzene	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
Naphthalene ^L	<22.6	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
4-Chloroaniline	<113	<95	<102	<100	<121	<122	<121	<123

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B2= The analyte was detected in the associated method blank. The analytic concentration in the sample was determined to be significantly higher than the method blank (>10 times the concentration).

<= Practical quantitation limit.

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c= The sample exceeds the EPA Region 9 Preliminary Remediation Goals (PRGs) for Residential Soil (mg/kg) for the associated contaminant.

d= The sample exceeds the EPA Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (mg/kg) for the associated contaminant.

L= Light Polynuclear Aromatic Hydrocarbons, H= Heavy Polynuclear Aromatic Hydrocarbons, C= Carcinogenic Polynuclear Aromatic Hydrocarbons

Table 2. Summary of Inorganic and Organic Analytical Results
McCormick and Baxter Creosoting Company
Portland, Oregon

CONTAMINANT OF CONCERN	Port of St. Helens				Morse Bros			
	Area A	Area B	Area C	Area D	Area 1	Area 2	Area 3	Area 4
Sample Designation	SH-A-042204	SH-B-042204	SH-C-042204	SH-D-042204	MB-01-042204	MB-02-042204	MB-03-042204	MB-04-042204
Date Sampled	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004
Organic (ug/kg)								
Hexachlorobutadiene	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
4-Chloro-3-methylphenol	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
2-Methylnaphthalene	<22.6	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
Hexachlorocyclopentadiene	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
2,4,6-Trichlorophenol	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
2,4,5-Trichlorophenol	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
2-Chloronaphthalene	<22.6	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
2-Nitroaniline	<22.6	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
Dimethylphthalate	<113	<95	<102	<100	<121	<122	<121	<123
Acenaphthylene ^L	<22.6	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
2,6-Dinitrotoluene	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
3-Nitroaniline	<113	<95	<102	<100	<121	<122	<121	<123
Acenaphthene ^L	<22.6	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
2,4-Dinitrophenol	<564	<475	<512	<500	<607	<608	<605	<613
4-Nitrophenol	<564	<475	<512	<500	<607	<608	<605	<613
Dibenzofuran	<56.4	<47.5	<51.2	<50	<60.7	<60.8	<60.5	<61.3
2,4-Dinitrotoluene	<113	<95	<102	<100	<121	<122	<121	<123
Diethylphthalate	<113	<95	<102	<100	<121	<122	<121	<123
4-Chlorophenylphenylether	<113	<95	<102	<100	<121	<122	<121	<123
Fluorene ^L	<22.6	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
4-Nitroaniline	<226	<190	<205	<200	<243	<243	<242	<245
4,6-Dinitro-2-methylphenol	<113	<95	<102	<100	<121	<122	<121	<123
N-Nitrosodiphenylamine	<22.6	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
4-Bromophenylphenylether	<113	<95	<102	<100	<121	<122	<121	<123
Hexachlorobenzene	<22.6	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
Pentachlorophenol	<113	<95	<102	<100	<121	<122	<121	<123
Phenanthrene ^L	<22.6	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
Anthracene	<22.6	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
Di-n-butylphthalate	<113	<95	<102	<100	<121	<122	<121	<123
Fluoranthene ^H	18.7J	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5

J= The analyte was analyzed for and positively identified, but the associated numerical value is an estimated quantity.

B2= The analyte was detected in the associated method blank. The analyte concentration in the sample was determined to be significantly higher than the method blank (> 10 times the concentration).

<= Practical quantitation limit.

C2= Second column confirmation was performed. The relative percent difference between the evaluated and determined to be < or = to 30%.

14.2 = an exceedance.

a= The sample exceeds the Oregon DEQ (2001) Guidance for Ecological Risk Assessment Level II Screening Level Values (mg/kg) for the associated contaminant.

b= The sample exceeds the Oregon DEQ (2002) Suggested Default Background Concentrations for Metals for Freshwater Sediment (mg/kg, dry weight) for the associated contaminant.

c= The sample exceeds the EPA Region 9 Preliminary Remediation Goals (PRGs) for Residential Soil (mg/kg) for the associated contaminant.

d= The sample exceeds the EPA Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (mg/kg) for the associated contaminant.

L= Light Polynuclear Aromatic Hydrocarbons, H= Heavy Polynuclear Aromatic Hydrocarbons, C= Carcinogenic Polynuclear Aromatic Hydrocarbons

Table 2. Summary of Inorganic and Organic Analytical Results
McCormick and Baxter Creosoting Company
Portland, Oregon

CONTAMINANT OF CONCERN	Port of St. Helens				Morse Bros			
	Area A	Area B	Area C	Area D	Area 1	Area 2	Area 3	Area 4
Sample Designation	SH-A-042204	SH-B-042204	SH-C-042204	SH-D-042204	MB-01-042204	MB-02-042204	MB-03-042204	MB-04-042204
Date Sampled	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004	4/24/2004
Organic (ug/kg)								
Pyrene ^H	26	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
Butylbenzylphthalate	<226	<190	<205	<200	<243	<243	<242	<245
3,3'-Dichlorobenzidine	<226	<190	<205	<200	<243	<243	<242	<245
Benzo(a)anthracene ^{H,C}	<22.6	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
Chrysene ^{H,C}	<22.6	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
bis(2-Ethylhexyl)phthalate	<226	<190	<205	<200	<243	<243	<242	<245
Di-n-octylphthalate	<226	<190	<205	<200	<243	<243	<242	<245
Benzofluoranthenes ^{H,C}	27.4J	<38	<41	<40	<48.6	<48.6	<48.4	<49
Benzo(a)pyrene ^{H,C}	16.9J	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
Indeno(1,2,3-cd)pyrene ^{H,C}	<22.6	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
Dibenz(a,h)anthracene ^{H,C}	<22.6	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
Benzo(g,h,i)perylene ^H	<22.6	<19	<20.5	<20	<24.3	<24.3	<24.2	<24.5
#2 Diesel	<27.5	<23.8	<25.9	<24.6	<29.3	<29.7	<27.5	<31.5
Motor Oil	<55	<47.6	<51.9	<49.2	<58.5	<59.5	<54.9	<62.9
Gasoline by NWTPh-G	<4.39	<4.22	<4.11	<4.18	<4.82	<4.94	<4.99	<5.04
Total LPAH	0	0	0	0	0	0	0	0
Total HPAH	89	0	0	0	0	0	0	0
Total CPAH	44.3	0	0	0	0	0	0	0
Total PAH	133.3	0	0	0	0	0	0	0

J= The analyte was analyzed for and positively identified, but the associated numerical value is an estimated quantity

B2= The analyte was detected in the associated method blank. The analyte concentration in the sample was determined to be significantly higher than the method blank (>10 times the concentration).

C2= Practical quantitation limit

C2= Second column confirmation was performed. The relative percent difference between the evaluated and determined to be < or = to 30%.

14.2 = an exceedance.

a= The sample exceeds the Oregon DEQ (2001) Guidance for Ecological Risk Assessment Level II Screening Level Values (mg/kg) for the associated contaminant.

b= The sample exceeds the Oregon DEQ (2002) Suggested Default Background Concentrations for Metals for Freshwater Sediment (mg/kg, dry weight) for the associated contaminant.

c= The sample exceeds the EPA Region 9 Preliminary Remediation Goals (PRGs) for Residential Soil (mg/kg) for the associated contaminant.

d= The sample exceeds the EPA Region 9 Preliminary Remediation Goals (PRGs) for Industrial Soil (mg/kg) for the associated contaminant.

L= Light Polynuclear Aromatic Hydrocarbons, H= Heavy Polynuclear Aromatic Hydrocarbons, C= Carcinogenic Polynuclear Aromatic Hydrocarbons

Table 3. Summary of Dioxin/Furan Analytical Results
McCormick and Baxter Creosoting Company
Portland, Oregon

Component (pg/g)	MB-02-042204	Qualifier	WHO 1997 TEF	TEQ	SH-A-042204	Qualifier	WHO 1997 TEF	TEQ	
2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD)	0.42	U		1	0	0.34	U	1	0
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (PeCDD)	0.83	U		1	0	0.75	U	1	0
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.97	U		0.1	0	0.88	U	0.1	0
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (HxCDD)	0.97	U		0.1	0	1.9	U	0.1	0
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (HxCDD)	0.98	U		0.1	0	0.88	U	0.1	0
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (HpCDD)	5	J		0.01	0.05	56		0.01	0.56
1,2,3,4,6,7,8,9-Octachlorodibenzo-p-dioxin (OCDD)	32			0.0001	0.0032	490		0.0001	0.049
2,3,7,8-Tetrachlorodibenzofuran (TCDF)	0.36	U		0.1	0	0.33	U	0.1	0
1,2,3,7,8-Pentachlorodibenzofuran (PeCDF)	0.62	U		0.05	0	0.52	U	0.05	0
2,3,4,7,8-Pentachlorodibenzofuran (PeCDF)	0.64	U		0.5	0	0.52	U	0.5	0
1,2,3,6,7,8-Hexachlorodibenzofuran (HxCDF)	0.87	U		0.1	0	0.72	U	0.1	0
1,2,3,7,8,9-Hexachlorodibenzofuran (HxCDF)	0.86	U		0.1	0	0.71	U	0.1	0
1,2,3,4,7,8-Hexachlorodibenzofuran (HxCDF)	0.98	U		0.1	0	0.82	U	0.1	0
2,3,4,6,7,8-Hexachlorodibenzofuran (HxCDF)	1.2	U		0.1	0	0.95	U	0.1	0
1,2,3,4,6,7,8-Heptachlorodibenzofuran (HpCDF)	0.69	U		0.01	0	7	J	0.01	0.07
1,2,3,4,7,8,9-Heptachlorodibenzofuran (HpCDF)	0.51	U		0.01	0	0.59	U	0.01	0
1,2,3,4,6,7,8,9-Octachlorodibenzofuran (OCDF)	1.1	U		0.0001	0	11	J	0.0001	0.0011
Toxicity Equivalency Quotient (TEQ)				0.0532				0.6801	

EPA Region 9 PRG for industrial soil is 16 pg/g

pg/g picograms per gram

32 = a detection